

Water Quality of the Ganges and Brahmaputra Rivers: An Impact Assessment on Socioeconomic Lives at Ganga–Brahmaputra River Basin



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1 Introduction and Objective

The river water quality of Ganges and Brahmaputra has gradually worsened due to the rising urbanization, industrialization practices, using of agrochemicals, industrial wastes disposal, water tourism activities, etc., over the years. Various studies such as [1–3] etc., had carried out to evaluate the water quality of the Ganges and Brahmaputra rivers. In our study, we consider observed average values of several water quality parameters including pH, DO, BOD, COD, conductivity, TSS and TDS of both the Ganges and Brahmaputra rivers during 2016–17 based on the above-mentioned research studies. All these parameters have been classified under three categories like drinking water, irrigation water and surface water, which actually determine the feasibility of river water for human consumption in terms of health aspect, economic viability for using river water and how river water can impact on social status of people residing in the Ganga–Brahmaputra river basin, respectively. Further, observed average values of all these parameters under three categories have been compared to the Indian Standard values of drinking water, irrigation water and surface water, respectively. Subsequently, the interpretation has been written, analyzing the water quality of both the rivers.

With this analysis, the main objective of the study is to find out whether the river water quality of the Ganges and Brahmaputra is suitable for human consumption, irrigation activities and daily household works within the recommended standards.

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2 Methodology

The secondary data consisting of observed average values of several water quality parameters including pH, DO, BOD, COD, conductivity, TSS and TDS of both the Ganges and Brahmaputra rivers during 2016–17 have been taken into account for analysis. All the observed average values of water quality parameters and the corresponding Indian Standard values of drinking water, irrigation water and surface water are written in a table. After that, comparative analyses have been carried out, and the final interpretation has been developed. From the interpretation, the results can be validated whether the river water quality of both the Ganges and Brahmaputra is suitable for human consumption, irrigation and daily usages within the suggested standards.

3 Results and Discussion

The comparative analyses have been carried out and reflected in the following table:

From Table 1, it is identified that observed average pH values of Brahmaputra and the Ganges rivers are very much within the recommended standards, which signifies that water of both the rivers can be used for human consumption (drinking purpose). Therefore, human health-related aspects are met with positive note. Similarly, pH values of both the rivers are very much within the recommended standards for irrigation and surface water activities, which determine that water of these two rivers is suitable for irrigation and other daily usages, respectively. Hence, it satisfies the economic and social perspectives in a positive direction.

From Table 1, it is noticed that observed average DO value of Brahmaputra river is above the recommended values for drinking, irrigation and surface water standards. In case of DO, if observed value is higher than standard value, then it signifies good and positive and vice versa. So, in this case, the Brahmaputra river water is suitable for human consumption, irrigation and other usages. Also, it satisfies the health, economic and social perspectives in a positive direction.

On the other hand, the observed average DO value of the Ganges river water is less against the recommended standard for drinking water. So, the Ganges river water is unsuitable for human consumption. Here, the health-related aspect is met with negative in nature. Apart from that, the average DO value of the Ganges river water is higher in both irrigation and surface water standards, respectively, which signify that the water is suitable for irrigation and other usages. Hence, it satisfies the economic and social perspectives in a positive direction.

From Table 1, it is identified that observed average BOD value of Brahmaputra river is less than the recommended values for drinking, irrigation and surface water standards. In case of BOD, if observed value is lesser than standard value, then it signifies good and positive and vice versa. So, in this case, the Brahmaputra river

Table 1 Comparative analyses of water quality parameters of Brahmaputra and the Ganges rivers

Brahmaputra river					The Ganges river				
Parameters (unit)	Average value ^a	Indian standard for drinking Water	Indian standard for irrigation Water	Indian standard for surface water ^b	Parameters (unit)	Average value ^a	Indian standard for drinking Water	Indian standard for irrigation Water	Indian standard for surface water ^b
pH (-)	8.26	8.5	8.5	8.5	pH (-)	7.42	8.5	8.5	8.5
DO (mg/L)	7.86	6	4	4	DO (mg/L)	4.57	6	4	4
BOD (mg/L)	1.73	2	3	3	BOD (mg/L)	2.41	2	3	3
COD (mg/L)	5.48	-	250	250	COD (mg/L)	5.88	-	250	250
Conductivity (S/m)	351.12	250	700	-	Conductivity (S/m)	412.78	250	700	-
TSS (mg/L)	62.20	-	30	-	TSS (mg/L)	75.00	-	30	-
TDS (mg/L)	178.54	500	1500	700	TDS (mg/L)	271.60	500	1500	700

^aThe average values have been taken from various previous research studies, which have been mentioned in References. ^b [4]

water is suitable for human consumption, irrigation and other usages. Also, it satisfies the health, economic and social perspectives in a positive direction.

On the other hand, the observed average BOD value of the Ganges river water is high against the recommended standard for drinking water. So, in this case, the Ganges river water is unsuitable for human consumption. Here, the health-related aspect is satisfied in negative note. Apart from that, the average BOD value of the Ganges river water is lesser in both irrigation and surface water standards, respectively, which signify that the water is suitable for irrigation and other usages. Hence, it satisfies the economic and social perspectives in a positive direction.

From Table 1, it is noted that observed average COD values of Brahmaputra and the Ganges rivers are very less against the recommended standards (excluding the standard values for drinking water, as the values are unavailable), which signifies that water of both the rivers can be used for irrigation and surface water activities. As the drinking water standard values are not available, so it is undecided whether the water is suitable for human consumption and satisfies the health-related aspect. Therefore, in this case, the COD water parameter of two rivers only satisfies the economic and social perspectives in a positive direction.

From Table 1, it is identified that observed average 'conductivity' value of Brahmaputra river is higher than the recommended value for drinking water standard but lower the recommended value for irrigation water standard. However, no recommended value is recorded for surface water standard. In case of 'conductivity,' if observed value is less than the standard value, then it signifies good and positive and vice versa. So, in this case, the Brahmaputra river water is termed as polluted and consequently unsuitable for human consumption. But, irrigation activities can be carried out with the Brahmaputra river water. So, the Brahmaputra river water quality only satisfies the economic perspective in a positive direction.

Similarly, from Table 1, it is identified that observed average 'conductivity' value of the Ganges river is higher than the recommended value for drinking water standard but lower the recommended value for irrigation water standard. However, no recommended value is recorded for surface water standard. Therefore, in this situation, the Ganges river water is polluted and not suitable for human consumption. But, irrigation activities can be performed with the Ganges river water. Hence, the Ganges river water quality only satisfies the economic perspective in a positive direction.

In case of TSS parameter, if the observed average value is less than the standard value, then it is considered as good and positive and vice versa. From Table 1, it is noticed that the observed average values of TSS for both Brahmaputra and the Ganges river water are higher than the irrigation water standard. Hence, the water of these rivers is recognized polluted and unsuitable for irrigation activities. However, no recommended standard has been found for drinking and surface water, respectively, for both the river water. So, in this case, only economic aspect is satisfied in a positive note.

Finally, in case of TDS parameter, if the observed average value is less than the standard value, then it is considered as good and positive and vice versa. From Table 1, it is identified that the observed average values of TDS for both Brahmaputra and the Ganges rivers are less than the standard values for drinking water, irrigation water and

surface water. Hence, water of both the rivers can be used for human consumption, irrigation and other usages. Here, the water quality satisfies health, economic and social perspectives in a positive direction.

4 Conclusion

After obtaining the research findings, it can be said that both the rivers are flowing with polluted substances. Out of total seven water quality parameters, some parameters suit for human consumption, irrigation and other usages but not all parameters satisfy the recommended quality standards. So, it is advised that both the rivers need water quality check before using in reality. Also, the proper implementation of efficient, rational and equitable river water management practices may intensify the socio-economic development in the region.

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